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NEW TAXA AND NOTES ON SOUTHERN AFRICAN *GLADIOLUS* (IRIDACEAE)[1]

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ABSTRACT

Three new species of *Gladiolus* and one new variety are described from the Cape Province of South Africa. *Gladiolus nigromontanus*, found in a wet site in the Swartberg Mts. in the southern Cape, is allied to the *G. gracilis–G. mutabilis* alliance and is unusual in blooming in the summer. *Gladiolus robustus*, endemic in the Baviaanskloof Mts., appears closely related to *G. carneus*, but is much larger and has several basal leaves that place it in a different group of the genus. *Gladiolus deserticolus* is apparently restricted to the summit of Cornellsberg, in the Richtersveld. The new variety, *G. rogersii* var. *vlokii*, is also described to accommodate an unusual series of populations flowering in the autumn and having heavily clawed corms. Major range extensions are reported for *G. punctulatus* var. *autumnalis, G. hyalinus* and *G. stokoei.*

UITTREKSEL

NUWE TAKSA EN AANTEKENINGE OOR SUIDER-AFRIKAANSE *GLADIOLUS* (IRIDACEAE)

Drie nuwe *Gladiolus*-species en een nuwe variëteit vanaf die Kaapprovinsie, Suid-Afrika, word beskryf. *Gladiolus nigromontanus* gevind in 'n nat omgewing in die Swartberg in die Suid-Kaap, is verwant aan die *G. gracilis–G. mutabilis* groep en is ongewoon omdat dit in die somer blom. *Gladiolus robustus*, endemies in die Baviaanskloofberge, skyn naverwant te wees aan *G. carneus* maar is heelwat groter en het verskeie basale blare wat dit in 'n ander groep in die genus plaas. *Gladiolus deserticolus* is blykbaar beperk tot die kruin van Cornellsberg in die Richtersveld. Die nuwe variëteit, *G. rogersii* var. *vlokii*, word ook beskryf om die ongewone reeks populasies wat in die herfs blom en wat swaar gekloude knolle het, te akkommodeer. Groot verspreidingsvergrotings word rapporteer vir *G. punculatus* var. *autumnalis*, *G. hyalinus* en *G. stokoei*.

Key words: *Gladiolus*, sp. nov., Iridaceae.

INTRODUCTION

Gladiolus, comprising some 150 species, is one of the larger genera of Iridaceae and the largest genus of the family in Africa. It occurs throughout the continent, particularly south of the Sahara, and extends into Europe and

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western Asia. Species are concentrated in southern Africa, where 103 species were recognised in the revision by Lewis *et al.* (1972), the only major treatment of *Gladiolus* since *Flora Capensis* (Baker, 1896). Despite having been studied intensively in the decade before the publication of the revison, *Gladiolus* appears to have been poorly collected in some parts of South Africa and in recent years several new taxa have been discovered and the ranges of several more substantially extended. *Gladiolus delpierrei* was described from the western Cape mountains (Goldblatt, 1979), *G. pugioniformis*, from the Natal Drakensberg (Hilliard & Burtt, 1979), *G. dolomiticus* and *G. cataractarum*, from the central and eastern Transvaal (Obermeyer, 1979; 1982), and *G. microcarpus* subsp. *italaensis*, from northern Natal (Obermeyer, 1981).

Continued botanical exploration in South Africa has yielded several more unusual forms that either represent significant range extensions or do not correspond with any of the taxa in the 1972 revision. In the southern Cape Province, J. J. Vlok, Department of Forestry, George, and M. Viviers, Department of Forestry, Algeria, discovered two new species, *Gladiolus nigromontanus* and *G. robustus* and a new variety, *G. rogersii* var. *vlokii*, all described here for the first time. Their collections have also extended the range of *G. punctulatus* var. *autumnalis* some 100 km to the east from the Langeberg at Heidelberg and Riversdale, to Ruitersbos and George. Along the west coast Peter Linder has recorded *Gladiolus stokoei* on Zebrakop in the Piketberg Mts., a species previously thought to be a local endemic of the Riviersonderend Mts. ca. 175 km to the south east. *Gladiolus hyalinus*, treated by Lewis *et al.* (1972) as occurring from the Cape Peninsula to Nieuwoudtville, has been collected much further north in Namaqualand in the Kamiesberg by myself and near Steinkopf by Graham Williamson. Lastly, the new *G. deserticolus* was discovered on the summit of Cornellsberg in the Richtersveld by E. G. Oliver, H. Tolken and S. Venter, on an expedition from the Botanical Research Institute, Pretoria.

A total of 110 species of *Gladiolus* is now recognised in southern Africa. Of these 74 occur in the Cape Floristic Region, most of them endemic. In this small area, comprising less than 5 % of the land surface of southern Africa, a winter rainfall pattern, unusual nutrient-poor soils and a very dissected landscape have combined to provide the background for rapid radiation and speciation in many genera of several unrelated plant families, including Iridaceae.

RANGE EXTENSIONS

1. **Gladiolus punctulatus** Schrank.

Lewis *et al.* (1972) recognise two varieties in this widespread, western and southern Cape species. The typical var. *punctulatus* occurs in the west, from Bredasdorp to Piketberg and is distinctive in having a pubescent inner basal sheath (cataphyll), and a long, narrow basal leaf blade. It blooms in winter and spring, from June to October.

In contrast, the autumn-blooming var. *autumnalis* Lewis has a glabrous, inner basal sheath and a distinctive short basal leaf blade. The variety has until now been known from only two localities in the central Langeberg, at Grootvadersbos and at Garcias Pass, both collections flowering in April. New populations have now been found near Ruitersbos (*Vlok 347*), in the eastern Langeberg north of Mossel Bay, flowering in March; and near George at Witfontein (*Moriarty 851*) blooming in April. These collections represent a significant range extension and an important addition to our knowledge of a poorly known variety. The plants from this eastern part of its range are unusual in having entirely glabrous leaves and larger bracts and flowers than other collections of var. *autumnalis*.

2. **Gladiolus stokoei** Lewis

Gladiolus stokoei is a striking, large red-flowered species previously known from only two collections, both made by Thomas Stokoe in a small area of the Riviersonderend Mts., east of Caledon. The species belongs to the *Exfoliati* group, the flowering scapes having no produced leaf. The foliage leaves are produced during the growing season, August to November, while the plants bloom in early autumn, in March and April. A new population was discovered some years ago by Peter Linder, who found plants on Zebrakop in the Piketberg Mts. His collection is clearly this species and it represents a significant increase in our knowledge of this rare species and a range extension of some 175 km westward. An article and fine illustration of *G. stokoei* was recently published in *Veld & Flora* (Holmes, 1983).

3. **Gladiolus hyalinus** Jacq.

Gladiolus hyalinus is a fairly common species of heavier soils on flats and lower mountain slopes between the Cape Peninsula and Nieuwoudtville in the western Cape. It has relatively small brownish to cream, often fragrant flowers produced from June to September. It is related to the larger flowered and better known *G. liliaceus*, the brown Afrikander or aandpypie, that extends from Clanwilliam to Port Elizabeth. *Gladiolus hyalinus* has now been found at two widely separated sites well to the north in Namaqualand. I collected it in the Kamiesberg Mts. on Rooiberg at 1 400 m (4500 ft.), flowering in early June (*Goldblatt 5573*) and it was abundant here on the moister southern slopes of ridges. It has also been collected recently west of Steinkopf in northern Namaqualand by Graham Williamson on a mountain summit near Klipfontein, flowering at the end of May (*Williamson 3016*). These records make it clear that *G. hyalinus* is not at all restricted to the Cape Floristic Region as previously believed, but is a very wide-ranging species of the west coast and near interior of winter-rainfall southern Africa.

NEW TAXA

1. **Gladiolus rogersii** Baker var. **vlokii** Goldbl.

One of the species of *Gladiolus* commonly known as 'bluebells', *G. rogersii* is allied to *G. inflatus*, the Tulbagh bell and *G. bullatus*, the Caledon bluebell. *Gladiolus rogersii* occurs in the southern Cape between Bredasdorp and Humansdorp and typically blooms in the spring months, from July to November. It is particularly difficult to distinguish from *G. inflatus*, to which it appears most closely allied. The major differences between these two species are, according to Lewis *et al.* (1972), soft corm tunics not drawn upwards in a neck and the lowermost tepal usually distinctly shorter than the lower laterals in *G. rogersii*; and hard, heavily clawed tunics, drawn up into a well-developed neck and the lower three tepals subequal in *G. inflatus*.

The distinction is blurred by a series of specimens of *Gladiolus rogersii* assigned to var. *graminifolius* Lewis, which have fairly hard corm tunics and a neck of varying thickness around the base. Most representatives of this taxon have a distinctive, relatively broad leaf lamina (2–9 mm wide) with margins not as much thickened as in var. *rogersii*. Additional material of what appeared to be *G. rogersii* var. *graminifolius* prompted a critical appraisal of the variety. This suggests that var. *graminifolius*, as circumscribed by Lewis *et al.*, is a heterogenous assemblage, comprising two distinct taxa. The collections cited by Lewis *et al.* include specimens matching the type, from the mountains of the Little Karoo that flower in the spring, but also some plants that flower in autumn, in April to May (*Wurts 1347* from Ladismith; *Wurts 90* from Swellendam). Lewis (unpublished annotations) suggested that these were merely flowering out of season. However, she failed to note that the autumn-flowering material (collected without corm coverings) appeared to lack the basal fibrous neck described as characteristic of the variety. A third population matching the above collections was discovered by Jan Vlok in the Langeberg at Ruitersbos, flowering at the beginning of March. These plants quite clearly lack a basal fibrous sheath. In addition, the corm tunics are relatively heavy and clawed. There seems little doubt that the autumn-flowering plants represent a series of populations distinct genetically, ecologically and morphologically from var. *graminifolius*. I suggest they be assigned to a new variety, var. *vlokii*, described below. The flowers of var. *vlokii* are typical of *G. rogersii* in having the lowermost tepal markedly smaller than the lower laterals and thus the variety seems well placed in *G. rogersii*.

Gladiolus rogersii var. **vlokii** Goldbl., var. nov.

Planta 300–450 mm alta, tunicis cormi perunguiculatis, cataphyllo membranaceo non in collum producto, foliis 3–4 infimo longiore 1–1,5 mm lato costis marginibusque incrassatis, floribus 5–6 coeruleis, autumno florente.

Type: South Africa, Cape, Ruitersbos Forest Reserve, in deep sand, *Vlok 348* (NBG, holotype: MO, PRE, isotypes).

Plants 300–450 mm high. *Corm* 10–13 mm in diameter, tunics strongly clawed. *Leaves* 3–4, the lowermost longest, 1–1,5 mm wide, with strongly thickened margins and midrib. *Spike* 5–6-flowered, *bracts* 12–15 mm long. *Flower* blue with dark blue and yellow markings on the lower tepals, lower lateral tepals ca. 30 mm long exceeding the lowermost tepal by 6–10 mm.

Flowering time: March and April.

Distribution: scattered in the Langeberg between Swellendam and Ruitersbos and in the Swartberg Mts. above Ladismith, at low to middle altitudes.

SOUTH AFRICA, CAPE—3320 (Montagu): Foot of 10 O'Clock Mt., Swellendam, 800 ft (-CD), *Wurts 90* (NBG).
—3321 (Ladismith): Foothills north of Ladismith, 2000 ft (-AD) *Wurts 1347* (NBG).
—3322 (Oudtshoorn): Ruitersbos Forest Reserve, near Coloured Township, Mossel Bay District (-CC), *Vlok 348* (MO, NBG, PRE).

2. **Gladiolus robustus** Goldbl., sp. nov. **Fig. 1.**

Planta 0,9–1,5 m alta 1–2 ramosa, cormo globoso 15–20 mm in diametro, tunicis mollibus membranaceis cormiferibus, foliis 7–9 ensiformibus planis ad 14 mm latis et 600 mm longis, spica ad 8 floribus, floribus carneis, tubo 30–35 mm longo, tepalis inaequalibus, superioribus ca 50 mm longis, inferioribus ca 45 mm longis, filamentis unilateralibus arcuatis, antheris 9–11 mm longis.

Type: South Africa, Cape, Baviaans Kloof Mts., farm Enkeldoorn, lower mountain slopes, 820 m, *Vlok 475* (NBG, holotype; MO, PRE, isotypes).

Plants 0,9–1,5 m high, robust. *Corm* globose, 15–20 mm in diameter, tunics soft membranous to subfibrous, bearing many small cormlets around the base. *Leaves* 7–9, ensiform, plane, up to 14 mm wide, to 600 mm high, the lower basal, the upper inserted on the lower part of the stem. *Stem* erect, usually 1–2-branched, slightly flexed at the base of the spike. *Spike* up to 8-flowered; *bracts* herbaceous, 30–40 mm long, the inner somewhat shorter than the outer. *Flowers* zygomorphic, pink with darker sagittate markings on the lower three tepals and dark markings in the throat; *perianth* *tube* 30–35 mm long, reaching to the apex of the bracts; *tepals* unequal, the upper ca. 50 mm long and to 29 mm wide, hooded, lower three ca. 45 mm long, to 14 mm wide, horizontal. *Filaments* unilateral and arcuate, ca. 20 mm long; *anthers* 9–11 mm long, arcuate lying under the uppermost tepal. Ovary 6–8 mm long, *style* arching over the filaments and dividing near the apex of the anthers, *style branches* ca. 8 mm long, broadest at the apices and bilobed. Capsule and seeds not known.

Flowering time: November to January.

Distribution: local in the Baviaanskloof Mts., in moist sites.

Gladiolus robustus is allied to the *G. carneus* complex of species, which includes *G. buckerveldii, G. angustus, G. undulatus* and *G. floribundus* as well as the widespread *G. carneus*. It appears initially to be only a form of the very variable *G. carneus*, but closer study reveals that *G. robustus* has a combination of the characteristic features of several species of this alliance. The large corms bear numerous small cormlets on stolons around the base, exactly as in some specimens of *G. undulatus*, a west coast species with a long perianth tube and acuminate and undulate tepals, a feature not found in *G. carneus*.

In its height and robust habit, *Gladiolus robustus* is matched only by some specimens of *G. angustus*, another west coast species, distinct in having a long perianth tube, well exserted from the bracts, while the narrow, usually undulate tepals are shorter than the tube.

The flower of *Gladiolus robustus*, with the tepals nearly equal in length to the tube, and the pale pink colour with hastate markings on the lower tepals, matches the more robust forms of *G. carneus*, which normally grows no more than 800 mm high, and has only 3–5 leaves. This is markedly different from the 7–9 broad leaves and the 0,8–1,5 m in height attained by *G. robustus*.

The leaf number places *Gladiolus robustus* in the *Plurifoliati*, one of the four informal groups of the genus erected by Lewis *et al.* All the other species of the *G. carneus* alliance, excepting the local Cedarberg endemic, *G. buckerveldii*, have 3–5 leaves and fall in group 2, the *Paucifoliati*. Despite this apparent inconsistency, there seems no reason to doubt to close affinity of *G. robustus* with *G. carneus*. In Lewis *et al.'s* treatment, *G. robustus* keys out to *G. ochroleucus*, an eastern Cape species, but it does not match specimens of this taxon, which has tough fibrotic leaves and an erect, rather densely flowered spike. The range of *G. robustus*, in the Baviaanskloof Mts. of the southern Cape, is well east of the range of *G. carneus*, which has been collected no nearer than the Riversdale district, some 200 km to the west. The species was brought to my attention by Jan Vlok and Mike Viviers, who made the type collection in November, 1982, and be-

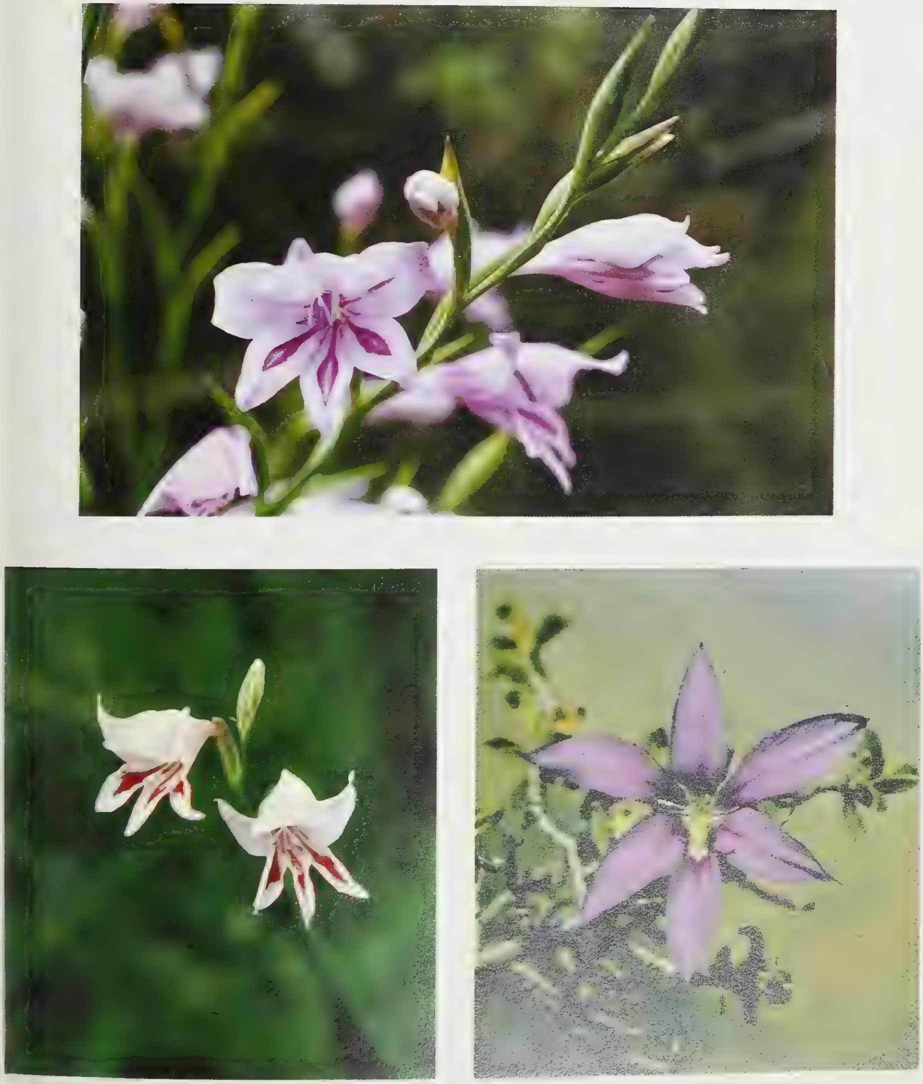

FIG. 1–3.
Flowers of the three new species of *Gladiolus* described in this paper, all taken in the wild, but the flower of *G. deserticolus* removed from the plant. 1. *G. robustus*; 2. *G. nigromontanus*; 3. *G. deserticolus*.

lieved that the species was new to science. The species appears to have been discovered earlier by R. D. Bayliss, who found it in the same general area of the Baviaanskloof Mts. flowering later, in January, in 1978.

SOUTH AFRICA, CAPE—3324 (Steytlerville): Baviaanskloof Forest Reserve, farm Enkeldoorn, lower mountain slopes, 820 m (-CB), *Vlok 475* (MO, NGB, PRE); Baviaans Kloof, bank of perennial stream, *Bayliss 8464* (MO).

3. **Gladiolus nigromontanus** Goldbl., sp. nov. **Fig. 2.**

Planta 300–400 mm alta, cormo ca. 16 mm in diametro, tunicis fibris tenuibus supra extensis, foliis 2–3, infimo basali marginibus costisque incrassatis, floribus 3–4 albis rubris signis, tubo ca. 15 mm longo, tepalis superioribus ad 30 mm longis, inferioribus ca. 25 mm longis.

Type: South Africa, Cape, south-facing slopes above Old Toll House, wet sandy ground on steep inclines, 950 m, *Vlok 175* (MO, holotype; K, NBG, SAAS, isotypes).

Plants 300–400 mm high. *Corm* globose-conic, ca. 16 mm in diameter at widest point, tunics light to dark brown, layers unbroken above, becoming broken into parallel fibres below, and extending upward to a neck of fine fibres. *Cataphyll* apparently solitary, brownish. *Leaves* 2(–3), lowermost basal, more or less dry at flowering time, sheathing in the lower half, enveloping stem for half to one-third of its length, lamina more or less oval in section, with thickened margins and midrib and two longitudinal grooves on each surface, second leaf becoming bract-like, sheathing the stem below and free in the upper 10–30 mm, a third entirely sheathing leaf or bract-leaf present in the upper part. *Stem* erect, flexed slightly at base of inflorescence, unbranched, with a leaf-like, sheathing bract in upper third. *Spike* secund, 3–4-flowered; *bracts* 13–17 mm long, herbaceous, inner 2–3 mm shorter than outer. *Flower* bilabiate, white with red spade-shaped markings in middle of lower three tepals; *perianth tube* ca. 15 mm long, shortly exserted from the bracts, cylindric, curved near apex; *tepals* unequal, upper hooded, to 30 mm long and ca. 12 mm wide, upper laterals narrower, lower tepals ca. 25 mm long, ca. 4,5 mm wide. *Filaments* unilateral, ca. 14 mm long; *anthers* arcuate, contiguous, ca. 6 mm long. Ovary ca. 3 mm long, *style* arcuate, held above the stamens, branching beyond apex of anthers, *branches* ca. 3 mm, broadened towards apices. Capsules and seeds not known. Chromosome number not known.

Flowering time: March.

Distribution: known only from the Swartberg Mts., on Swartberg Pass at ca. 950 m.

Gladiolus nigromontanus was discovered by Mike Viviers, in the summer of 1981, in full bloom on the Swartberg Pass near Oudtshoorn. It is a distinctive species, belonging in Lewis *et al.*'s third infrageneric grouping *Unifoliati*, having a single long basal leaf at anthesis, and 2–3 reduced cauline leaves. In *G. nigromontanus* the basal leaf sheathes the stem for half to one-third of its length and seldom reaches the base of the spike. It is most closely related within the *Unifoliati* to the *G. gracilis–G. exilis–G. mutabilis* alliance and has the corm tunics and habit of these species. It is unusual, however, in the neck of fibres round the base of the stem, not found in the related species and in its white flower with red spade-shaped markings on the lower tepals (Fig. 2) that are quite unlike the spotted or streaked markings found in its allies. The flower is also distinctive in the length of the perianth tube which is long and exserted 2–4 mm from the bracts. In other species of the group the tube is enclosed entirely and emerges between the bracts.

Gladiolus nigromontanus is unusual in flowering in late summer, a feature uncommon in the *Unifoliatae*, but known in *G. exilis* and *G. delpierrei*, and like these species, it relies on additional moisture from seeps and underground drainage channels during the hot dry summers of the interior southern Cape mountains. Most of the several summer and autumn-blooming *Gladiolus* species of the winter rainfall area belong to the *Exfoliati* group, and are hysteranthous, with leaves and flowers produced at different seasons. The leaf of *G. nigromontanus*, dry at flowering time, suggests an affinity with the *Exfoliati* but species of this group have no basal leaf at all on the flowering stems.

SOUTH AFRICA, CAPE—3322 (Oudtshoorn): Swartberg Pass, above Old Toll House, 950 m, on steep south-facing slopes in wet ground (-AC), *Vlok 175* (K, MO, NBG, SAAS).

4. **Gladiolus deserticolus** Goldblatt, sp. nov. **Fig. 3.**

Planta 8–150 mm alta, cormo globoso 8–10 mm in diametro, tunicis fibrosis, cataphyllo purpureo maculato, foliis 4 linearibus planis 1–1,5 mm latis, spica 1–4 floribus, floribus caeruleis, tubo 6–7 mm longo, tepalis subaequalibus, superiore 16–18 mm longis, inferioribus 14–16 mm longis, filamentis unilateralibus arcuatis, antheris ca 4 mm longis.

Type: South Africa, Cape, Richtersveld, Stinkfontein Mts., Cornellsberg, ridge south of beacon, 1 300 m, *Oliver, Tolken & Venter 706* (PRE, holotype; MO, STE, isotypes).

Plants 80–150 mm high, slender. *Corm* conic, 8–10 mm in diameter, tunics fibrous, lightly clawed below. *Cataphyll* solitary, reaching shortly above the ground and mottled purple and white. *Leaves* 4, linear, plane, 1–1,5 mm wide, the lowermost longest and exceeding the stem, the others cauline, progressively shorter, the lower basal and the uppermost inserted just below the spike and becoming bract-like and sheathing in the lower half. *Stem* erect, occasionally 1–2-branched, flexed above the sheathing parts of the cauline leaves. *Spike* 1–4-flowered, flexuose; *bracts* herbaceous, the margins hyaline, 10–14(–16) mm long, the inner usually somewhat shorter than the outer. *Flowers* nearly actinomorphic but the upper tepals somewhat larger than the lower and the stamens evidently unilateral and arcuate, blue with a pale yellow centre; *perianth tube* 6–7 mm long cylindric, widening towards the apex, reaching to the apex of the bracts; *tepals* lanceolate, subequal, somewhat clawed below, the upper somewhat larger and inclining over the anthers, 16–18 mm long, ca. 5 mm wide, the other tepals 14–16 mm long. *Filaments* unilateral, ca. 5 mm long; *anthers* ca. 4 mm long, yellow, arching under the upper tepal. Ovary 2–3 mm long, *style* arching over the filaments and dividing near the apex of the anthers, *style branches* ca. 3 mm long, broadest at the apices and bilobed. Capsule and seeds not known.

Flowering time: August to early September.

Distribution: apparently local in the Stinkfontein Mts., in the Richtersveld, in the shade of low south-facing cliffs.

Gladiolus deserticolus is an unusual species of *Gladiolus* in that the flowers are nearly actinomorphic (Fig. 3). The tepals are subequal and spreading almost to the same extent, but the upper tepals seem somewhat larger than the lower and the stamens appear to be unilateral with arcuate, nearly contiguous anthers. It is probably related to the widespread, winter rainfall area *G. scullyii*, a particularly common species in Namaqualand and the drier areas of the western Cape coast. From the limited material available, it seems that *G. deserticolus* differs in size both in the vegetative parts and in the flower, *G. scullyi* being much larger. The flowers of *G. scullyi* are strongly zygomorphic with distinctively smaller, clawed lower tepals that are sharply flexed at the base of the limb. It also has several leaves, usually 3–5 of which are basal in contrast to the 1–2 basal leaves of *G. deserticolus*. The mottled basal sheath of *G. deserticolus* is also a distinctive feature and another in which it differs from *G. scullyi*. Jan Vlok (pers. comm.) has suggested that *G. deserticolus* may be more closely allied to *G. stellatus*, a southern Cape species which has very short-tubed actinomorphic flowers. *Gladiolus stellatus* has several leaves which have the margins and midribs conspicuously thickened, and a straight rather than flexouse spike. There is certainly merit in Vlok's observation but I believe that apart from the similar actinomorphic flower, *G. deserticolus* shares more characters with *G. scullyi* than with *G. stellatus*.

The species was apparently first collected by an expedition from the Botanical Research Institute that explored the Richtersveld in the spring of 1977. It grows in sheltered sites in partial shade at the foot of low south-facing cliffs. Fruiting specimens found by Mike Viviers in 1983 in the same locality are tentatively assigned to *G. deserticolus*. Seed will be grown and flowered to confirm the identification and to make a permanent record. The fruiting material had winged seed characteristic of *Gladiolus*.

SOUTH AFRICA, CAPE—2817 (Vioolsdrif): Richtersveld, Stinkfontein Mts., Cornellsberg, ridge south of beacon (-DC), 1 300 m, *Oliver, Tolken & Venter 706* (PRE, MO, STE).

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